



# INFORMATION SHEET

## Zero Childhood Cancer: The science behind the Program

Each child's cancer is unique at a molecular level, determining the responsiveness or resistance of that child's cancer cells to various anti-cancer drugs. Two children who have the 'same' kind of cancer – say acute lymphoblastic leukaemia – and who show the same symptoms, may nevertheless respond very differently to the same anti-cancer drugs. For that reason, the goal of Zero Childhood Cancer is to treat each child's cancer in the most targeted way possible, with a view to pushing survival rates towards 100%.

Cancer cells taken from each child will be analysed biologically and genetically in great depth, in the laboratories of Children's Cancer Institute. The genetic changes that allow the cancer to thrive, and that indicate likely resistance or sensitivity to particular anti-cancer drugs will be pinpointed, and the drugs most likely to kill that particular child's cancer will be identified in the laboratory, by rapid screening of hundreds of potential drugs and drug combinations.

In addition to growing a child's tumour cells in laboratory test-tubes, the individual child's tumour will be grown in a biological model to get further indications of which drugs are likely to be most effective for treating that child's cancer. The child's clinician will then receive a report outlining the various findings, and then with guidance from a specialist group of doctors and researchers will use this information to guide their treatment, as part of a new national clinical trial.

In order to collate all the essential data from each patient that will be used to guide treatment decisions, Children's Cancer Institute is in the process of customising a state-of-the-art Laboratory Information Management System, which will allow this information to be linked and stored.

In addition, existing state-of-the-art robotic instrumentation at the Institute's ACRF Drug Discovery Centre, allows rapid high-throughput screening of individual patients' tumour cells against hundreds of drugs and drug combinations, within hours.

Once all the necessary standard operating procedures and other capabilities have been developed and optimised, Sydney Children's Hospital will then open a small pilot study to ensure feasibility, safety and timeliness of this approach, including the delivery of laboratory information to clinicians to enable clinical decision making in real-time.

Children's Cancer Institute and Sydney Children's Hospital have won awards for their delivery of molecular diagnostic testing in real-time to clinicians around Australia for children with acute lymphoblastic leukaemia, the commonest childhood cancer. This testing identifies those children with this disease who are at highest risk of treatment failure, and guides the introduction of intensified treatment in these children by their oncologists. This approach has resulted in a doubling of survival rates for these high risk children, and has now been adopted as standard of care for children with acute lymphoblastic leukaemia around the country.

Zero Childhood Cancer is now building on that expertise, and on the strength of the bench-to-bedside partnership which researchers at Children's Cancer Institute and clinicians at Sydney Children's Hospital have established over many years, to now offer a more personalised approach to cancer care for all children with high-risk malignancies, not just leukaemia.